Project Operational Plan for the 1997 Aleutian Islands Golden King Crab Pot Survey

By

Leslie J. Watson
and
S. Forrest Blau

Regional Information Report[1] No. 4K97-39

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
211 Mission Road
Kodiak, Alaska 99615

July 1997

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Management and Development Division.

ACKNOWLEDGMENTS

Special thanks to Doug Pengilly, Donn Tracy, and Larry Byrne, Alaska Department of Fish and Game Westward Region shellfish research staff for their assistance in planning for the 1997 Aleutian Islands golden king crab survey. In addition we would like to thank Lucinda Neel, publication specialist for final document formatting and report distribution.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ALASKA DEPARTMENT OF FISH AND GAME
COMMERCIAL FISHERIES MANAGEMENT AND DEVELOPMENT DIVISION

PROJECT OPERATIONAL PLAN

Title:	*Project Operational Plan for the 1997 Aleutian Islands Golden King Crab Survey*	
Yellow Book Project No(s):	*TF-785* (Appendix A)	
Project Leader:	*Donn Tracy*	**PCN:** *11-1857*
Biometrician:	*Ivan Vining*	**PCN:** *11-1227*
Date Submitted:	*July 3, 1997*	
Region:	*Westward*	
Fishery Unit:	*Bering Sea/Aleutian Islands Crab*	
Fishery:	*Aleutian Islands Area O Brown King Crab*	
Fishery Management Plan:	*Fishery Management Plan for the Commercial King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands*	
File Name:	*C:\leslie\gkc97pop.doc*	

APPROVALS

Level	Signature	Date
Project Leader:	_____	_____
Biometrician:	_____	_____
Research Supervisor:	_____	_____
Regional Supervisor:	_____	_____
Headquarters' Receipt:	_____	_____
Headquarters' Recommendation:		
Further Review:	_____	_____
Approval:	_____	_____

FOREWORD

This project is funded under the State of Alaska Bering Sea Crab Test Fishery Program (BSTF). Initiated in 1990, the primary focus for the program has been centered on Bristol Bay red king crab research. The first ADF&G survey on golden king crabs occurred during the summer of 1991 in the Aleutian Islands and was funded by the BSTF. Beginning in 1995, ADF&G began triennial king crab surveys on a rotating basis for St. Matthew blue king crabs, Norton Sound red king crabs (1996), and Aleutian Islands golden king crabs (1997). BSTF project operational plans are documented in Watson and Pengilly (1992, 1993a, 1993b, 1994, 1996), Watson et al. (1995a, 1995b), Blau (1992), Blau et al (1996), and Tracy and Pengilly (1996).

INTRODUCTION

The economic importance of the Aleutian Islands fishery for golden (or "brown") king crab *Lithodes aequispinus* is substantial, with 121.5 million pounds worth an estimated exvessel value of $338 million landed from 1980 to 1995 (ADF&G 1997). Despite the value of the fishery, little is known regarding the abundance, distribution, and basic life history parameters of the golden king crab population. Historically, there has been no program for performing systematic surveys of Aleutian king crabs on a regular basis. The impact of management measures and fishing practices have been difficult to assess without the baseline survey data needed to monitor the population.

In the absence of regular surveys, ADF&G and National Marine Fisheries Service biologists have collected biological data on golden king crabs from trawlers and crab vessels fishing in the Aleutian Islands (Molyneaux 1985, Urban 1986, Blau 1987, McBride et al. 1982, Ronholt et al. 1982, Otto 1983, Otto et al. 1983, Otto and Cummiskey 1985, Somerton and Otto 1986, Beers 1991, 1992; Tracy 1994, 1995a, 1995b; Boyle et al. 1996). In 1991, the Alaska Department of Fish and Game conducted its first systematic survey of golden king crabs in portions of the former Dutch Harbor and Adak king crab management areas, which provided information on the distribution of golden king crabs by depth, size frequency, and growth-per-molt information (Blau and Pengilly 1994). Approximately 1,250 legal male golden king crabs were tagged during that survey and recoveries were monitored through at-sea observers and ADF&G dockside samplers in the subsequent commercial fisheries. Tag recovery rates were calculated for each area and recovery year, but provided a poor estimate of harvest rates due to incomplete tag recovery monitoring.

Inseason management and biological information on golden king crabs in the Aleutians has been obtained since 1988 through at-sea data collections onboard catcher-processors and floating processors under the state's mandatory observer program. However, as the number of catcher-processors participating in the commercial fishery declined through the mid-1990s, collection of data declined due to the lack of observer coverage (Boyle et al. 1996). In response to the lack of current fishery information, the Alaska Board of Fisheries (BOF) implemented regulations in March 1995 that expanded observer coverage to include all catcher vessels fishing in the subsequent 1995/96 Adak and Dutch Harbor commercial seasons (ADF&G 1996a).

The Adak fishery has historically been managed on the basis of size, sex, and season, and monitored through inseason catch reporting to measure fishery performance against historic catch data (ADF&G 1996b). While a formal guideline harvest level was never set for the Dutch Harbor area, it has been managed based on an average harvest goal of approximately 1.5 million pounds. Analysis of historic landings indicates that there are two areas within Area O that support the commercial fishery; one to the east of 174° W longitude, and the other to the west of 174° W longitude (Figure 1). Historically, golden king crabs were harvested disproportionately east and west of 171° W longitude, the boundary between the former Dutch Harbor and Adak Management Areas.

In March 1996, the Alaska Board of Fisheries (BOF) passed regulations that combined the Dutch Harbor and Adak king crab management areas into the new Aleutian Islands king crab management area (Area O)(ADF&G 1996a). The BOF directed ADF&G to manage the eastern portion of the population consistent with historic harvest goals established for the former Dutch Harbor area. To that end separate harvest goals were established east and west of 174° W longitude within the new Area O Management Area. Beginning in the 1996/97 fishery, a harvest goal of 3.2 million pounds was set for the eastern portion of Area O by applying the most recent five year average harvest of 1.6 million pounds for the Dutch Harbor area to the portion of the population between 171° and 174° W longitude and to the portion of the population east of 171° W longitude. A harvest goal of 2.7 million pounds was set for the population west of 174° W longitude based on the most recent five year average harvest from the former Adak Management Area west of 174° W longitude.

The 1997 survey will sample a portion of the golden king crab population in waters immediately adjacent to 171° W longitude, the boundary line between the former Adak and Dutch Harbor Management Areas (Figure 2). Systematic survey data will provide a baseline, relative stock index of golden king crabs that can be compared with indices from future triennial surveys and data collected by observers. The opportunity for tagging a portion of the eastern population, and, subsequently examining most of the commercial catch for recaptures of tagged crabs is possible with 100% observer coverage in the 1997/98 fishery. Such data can be used to estimate the minimum harvest rate within the survey area. Tag recovery data from this and future fisheries can also provide estimates of male and female growth per molt, characterize changes in the female reproductive cycle, and determine crab movements.

OBJECTIVES

Prioritized objectives of the 1997 Aleutian Islands golden king crab survey and subsequent tag recovery program during the 1997/98 commercial fishery are listed below.

1. Determine a relative stock index of golden king crabs in a portion of the Aleutian Islands Management Area as indicated by catch per unit effort from the 1997 systematic pot survey.

2. Estimate harvest rates for legal male golden king crabs using tag recovery rates calculated from recaptures of tagged crabs during the 1997/98 Aleutian Islands commercial fishery as follows:

    a. Determine a minimum harvest rate for the entire 1997 survey area; and,

b. Determine separate, minimum harvest rates for surveyed areas east and west of 171° W longitude.

3. Determine movements of male and female golden king crabs from recaptures of tagged crabs during the 1997/98 Aleutian Islands commercial fishery.

4. Document growth of male and female golden king crabs $\geq$ 90 mm CL from recovered tagged crabs.

5. Characterize female brooding and molting cycles using recoveries of tagged crabs from the 1997/98 commercial fishery and from ovarian samples collected on the survey.

6. Determine the geographic and depth distribution of male and female golden king crabs $\leq$ 25 mm CL from survey catches.

7. Develop weight-length relationships for male and female golden king crabs of all sizes from survey catches to augment existing length-weight data collections.

METHODS

The survey will be conducted aboard the chartered vessel FV *Spirit of the North* from July 25-August 28, 1997 in the Aleutian Islands Management Area centered near Yunaska and Amukta Islands (52.5° N latitude and 171° W longitude)(Figure 2). The charter will begin and end in Dutch Harbor. Ship personnel will include the captain-owner of the FV *Spirit of the North* an engineer and four deckhands. ADF&G survey crew will consist of two biologists and two technicians.

Study Area

Aleutian Island Management Area (Area O) is too large to cover in a 35 day charter. Survey effort must therefore be restricted to a portion of Area O that supports a significant portion of the harvestable population of golden king crabs. The 1997 Aleutian Islands survey area and station array was determined from geographic distribution of historic golden king crab fishery effort (fish ticket data), geographic distribution and density of golden king crabs from the 1991 ADF&G Aleutian Islands golden king crab survey, and location of observer pot samples from the 1996/97 fishery east of 174° W longitude. Forty-three percent of the total number of crabs delivered in the 1992-1995 Adak and Dutch Harbor seasons came from statistical catch areas within the proposed survey grid (705200, 705231, 705232, 705233, 715201, 715202, 715231, and 715232 (Table 1). While the 1996/97 Aleutian Islands fishery is still in progress west of 174° W. longitude, 49% of the harvest east of 174° W longitude was harvested from statistical catch areas within the survey grid when the eastern portion of the fishery closed on December 25, 1996 (Table 2). The slightly larger 1997 survey area overlaps the 1991 survey area to a large degree as depicted by statistical catch area in Table 3.

Location of pots sampled by observers in the 1996/97 fishery east of 174° W longitude were assessed to determine potential observer coverage of the 1997/98 commercial fishery in areas where crabs tagged during the survey would be recaptured. Of the 3,988 pots sampled by observers in the 1996/97 fishery east of 174° W longitude, 44% of them were within the proposed 1997 survey area (Table 4).

Station Grid and Pot Array

The 1997 survey station layout is based on a grid of 89 stations. The western end of the stations are spaced 5 nautical miles (nm) apart, both north-and-south and east-and-west. Each station is 0.89 nm long and consists of 10 pots spaced 0.0987 nm (100 fm) apart and are arrayed east to west; station location coordinates are shown in Table 5. The target soak time for each pot is 48 to 72 hours.

Survey Coverage Goal and Itinerary

Stations have been prioritized in the event that insufficient time is available to complete all 89 stations; contingency stations are located at the western end of the study area and will be fished on a time-available basis (Figure 2, Table 5). The survey will begin at the easternmost station and proceed west. The proposed daily itinerary for setting and picking stations assumes that three stations can be set and three stations can be pulled per day and that sampling and tagging goals for all pots can be completed (Table 6). Those assumptions are based on experience from the 1991 Aleutian Islands golden king crab survey. The itinerary allocates enough time to sample all 89 stations; however, inclement weather and tides are expected to hamper survey work such that the 3 day buffer built into the itinerary will likely be used.

A standard survey grid has been established for the triennial golden king crab surveys in the Aleutian Islands by the Westward Region shellfish research staff (Appendix B.1). Location of each of the 183 stations is noted in Appendix B.2.

Catch Sampling

The contents of each pot at each station will be fully enumerated to provide catch per unit effort (CPUE), and sex, size and species composition data. The Pilot House Log will be completed for each survey pot fished (Appendix C.1).

All crabs will be handled gently during sorting, measuring and tagging, and will be released immediately following sampling or tagging into the vessel water trough. Tagging of male crabs $\geq$121 mm CL (prerecruit ones and legal-sized) will be completed first so that the amount of time these crabs are on deck is reduced prior to release. Tagging of female and smaller sublegal male golden king crabs will then be completed. Crabs infected with parasitic barnacles or cracked carapaces, torn leg segments, or any other new injuries, will not be tagged. Crabs with old injuries (regenerated legs, black leg caps, etc.) will be tagged. The tags used will be "B" series, numbered 1-10,000. In addition to tagging, determination of legal-sized males, shell ages for males and

females, and female reproductive status will also be recorded. All measurements and associated tagging data for males and females will be recorded on the ADF&G Aleutian Islands Triennial Golden King Crab Survey Data Form (Appendix C.2). Small golden king crabs captured in minnow traps will be documented on the Golden King Crabs in Minnow Traps (Appendix C.3).

Following tagging and sampling of golden king crabs, other crabs, invertebrates, and commercially important fish species will be counted and measured. Other commercially-important crab species that may be caught include grooved Tanner crab *Chionoecetes tanneri* and scarlet king crab *Lithodes couesi.* Commercially important groundfish, especially Greenland turbot *Reinhardtius hippoglossoides*, Pacific halibut *Hippoglossus stenolepis*, Pacific cod *Gadus macrocephalus*, sablefish *Anoplopoma fimbria*, and Atka mackerel *Pleurogrammus monopterygius* will be documented.

Tagging Strategy

Tagging goals for male and female golden king crabs ≥ 90 mm CL are shown below, with tagging priority listed in descending order. Projected numbers of crabs to be tagged were generated using average catch per pot of sex-size groups from the 1991 survey.

Priority	Sex-Size Group	Tagging Goal	Average CPUE from 1991 ADF&G GKC Survey	Estimated No. of Tagged Crabs
1	Prerecuit Ones & Legal Males (≥ 121 mm CL)	100 %	4.1	3,198
2	Females ≥ 90 mm CL	1 of 2	7.3	2,847
3	Sublegal Males (90-120 mm CL)	1 of 2	3.1	2,418
			Estimated Total Number of Tagged Crabs:	8,463

If pot catches of sublegal males or females significantly slows completion of daily sampling and pot setting, they will be tagged in lesser proportions, e.g., 1 of 4 or 1 of 5.

Ancillary Data Collections

A number of small-scale studies will be conducted on a time-available basis during the survey.

Crab Weights

Male and female golden king crabs will be sampled for weights over their length ranges to develop weight-length relationships for each sex. Weights for individual crabs will be recorded on ADF&G Aleutian Islands Triennial Golden King Crab Data Form (Appendix C.2). Details of minimum sampling at various size groups is presented in the Shipboard Instructions for the 1997 Triennial Aleutian Island Golden King Crab Survey.

Ovarian Weights

Female golden king crabs will be examined to determine the relationship between carapace length, ovarian weight, and embryo condition. Observations will be recorded from crabs ranging from 80 to 140 mm CL, by 5-mm size increments. Five crabs will be sampled for each of the following clutch/embryo conditions: 1. clean setae; 2. uneyed embryos (non-hatching); 3. eyed embryos (hatching); and 4. crabs having empty embryo cases.

Minnow Traps for Small Golden King Crabs

The purpose of this study is to: 1. determine if minnow traps can collect small ($\leq$ 25 mm CL) golden king crabs (GKC), 2. document the depths that small GKC are found; and 3. determine what baits, if any, attract small GKC. Although the mesh on the survey pots is small (2" stretched mesh), plastic minnow traps with 1/4" mesh will be used in and attempt to capture small GKC by attaching one minnow trap in nearly every survey pot. Minnow trap catch data will be recorded as shown in Appendix C.3.

Parasitic Barnacle Observations

A maximum of 10-20 dissections of crabs with *Briarosaccus callosus* externae or externae holes on their abdomens will be made on a time available basis.

Temperature Profiles

Bottom temperatures will be obtained by placing Brancker Model TR-1000 submersible temperature recorders (STRs) in selected pots to measure bottom temperatures representative of those encountered throughout the survey.

Tag Recovery

An intensive tag recovery program involving shellfish observers and ADF&G dockside samplers for the return of tagged 1997 golden king crabs will be initiated during the 1997/98 Aleutian Islands commercial fishery. All recovered tagged crabs will be measured, assessed for legal status and shell age, and complete recapture location data from vessel captains reported as detailed in Appendix D. In addition, any tagged golden king crabs from ADF&G's 1991 Aleutian Islands survey or those released from the FV *Alaska Trojan* in 1996 recaptured on the 1997 survey will be recorded on the ADF&G Westward Region Tagged Crab Recovery Form (Appendix D.3), then released again.

SCHEDULES

Dates	Personnel	Activity
7/96-7/97	Blau, Pengilly, Tracy	Project planning, solicit vessel charter bids.
4/97-6/97	Blau, Watson, Byrne	Prepare POP, PRs for major purchases, shipboard instructions, survey gear.
7/97-8/97	Blau, Morrison, Schwenzfeier, Wilson	Conduct 35 day survey in waters of Area O (Aleutian Islands).
8/97	Watson	Travel to Dutch Harbor to brief observers and dockside sampling staff on recovery of tagged crabs.
9/97	Blau, Watson	Edit and compile survey data.
10/97-12/97	Blau, Watson, Vining	Write survey report.
9/97-98	Moore	Maintain tag recovery database.

REPORTS

Date	Author(s)	Report
5/97	Watson, Blau	Project Operational Plan for the 1997 Aleutian Islands golden king crab survey.
12/97	Blau, Watson, Vining	Findings from the 1997 Aleutian Islands golden king crab survey.
?/98	Blau et al.	Recoveries of tagged golden king crabs from the 1997/98 Aleutian Islands commercial fisheries.

LITERATURE CITED

Alaska Department of Fish and Game (ADF&G). 1996a. Commercial shellfish regulations, 1996-1997 edition. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Juneau.

Alaska Department of Fish and Game (ADF&G). 1996b. Annual management report for the shellfish fisheries of the Westward Region, 1994. Alaska Department of Fish and Game, Commercial Fisheries and Management Division, Regional Information Report No. 4K96-37, Kodiak.

Alaska Department of Fish and Game (ADF&G). 1997. Annual management report for the shellfish fisheries of the Westward Region, 1995. Alaska Department of Fish and Game, Commercial Fisheries and Management Division, Regional Information Report No. 4K97-16, Kodiak.

Beers, D. 1991. A summary of data contained in the mandatory crab observer database. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K91-14, Kodiak.

Beers, D.E 1992. Annual biological summary of the Westward Region shellfish observer database, 1991. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K92-33, Kodiak.

Blau, S. F. 1987. Adak observer crab report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak (unpublished and confidential).

Blau, S.F. 1992. Project operational plan for the 1991 Aleutian Islands golden (brown) king crab survey. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K92-29, Kodiak.

Blau, S.F., and D. Pengilly. 1994. Findings from the 1991 golden king crab survey in the Dutch Harbor and Adak management areas including analysis of recovered tagged crabs. Alaska Department of Fish and Game, Commercial Fisheries and Management Division, Regional Information Report No. 4K94-35, Kodiak.

Blau, S.F., L.J. Watson, and D. Pengilly. 1996. Project operational plan for the 1996 Norton Sound red king crab trawl survey. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K96-42, Kodiak.

Boyle, L., L.C. Byrne, H. Moore, and D. Pengilly. 1996. Alaska Department of Fish and Game Summary of the 1995 mandatory shellfish observer program database. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K96-47, Kodiak.

LITERATURE CITED (Cont.)

Gish, R. 1997. The commercial king crab fisheries in the Aleutian Islands management areas. A report to the Alaska Board of Fisheries. Commercial Fisheries Management and Development Division, Regional Information Report 4K97-15, Kodiak.

McBride, J., D. Fraser, and J. Reeves. 1982. Information on the distribution and biology of the golden (brown) king crab in the Bering Sea and Aleutian Islands area. NOAA (National Oceanic and Atmospheric Administration), NWAFC (Northwest Alaska Fisheries Science Center) Processed Report 92-02.

Molyneaux, D.B. 1985. 1985 fishing vessel observer program, Adak Area brown king crab season, summary from the FV *Coastal Glacier* March 10-27, 1985. Alaska Department of Fish and Game, Dutch Harbor (unpublished and confidential).

Otto, R.S. 1983. A summary of data on golden king crab with proposed size limits and fishing seasons. Report to: North Pacific Fishery Management Council and the Alaska Board of Fisheries, National Marine Fisheries Service (NMFS), Northwest Fisheries Center (NWFC) (unpublished).

Otto, R.S., R.A. MacIntosh, K.L. Stahl-Johnson, and S.J. Wilson. 1983. Report to industry on the 1983 eastern Bering Sea crab survey. NOAA (National Oceanic and Atmospheric Administration), NWAFC (Northwest Alaska Fisheries Science Center) Processed Report 83-12.

Otto, R.S., and P.A. Cummiskey. 1985. Observations on the reproductive biology of the golden king crab (Lithodes aequispina) in the Bering Sea and Aleutian Islands. Pages 123-136 *in* Proceedings of the international king crab symposium. University of Alaska Sea Grant Report No. 85-12.

Ronholt, L.L., F.R. Shaw, and T.K. Wilderbuer. 1982. Trawl survey of groundfish resources off the Aleutian Islands, July-August 1980. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service NOAA Technical Memorandum NMFS/NWC-23.

Somerton, D.A., and R.S. Otto. 1986. Distribution and reproductive biology of the golden king crab, *Lithodes aequispina*, in the eastern Bering Sea. Fisheries Bulletin 84(3):571-584.

Tracy, D.A. 1994. Alaska Department of Fish and Game biological summary of the 1992 mandatory shellfish observer program database. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K94-10, Kodiak.

LITERATURE CITED (Cont.)

Tracy, D.A. 1995a. Alaska Department of Fish and Game summary of the 1993 mandatory shellfish observer program database. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K95-14, Kodiak.

Tracy, D.A. 1995b. Alaska Department of Fish and Game summary of the 1994 mandatory shellfish observer program database. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K95-32, Kodiak.

Tracy, D., and D. Pengilly. 1996. Project operational plan for the Bering Sea test fishery program: 1996 Bristol Bay red king crab project. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K96-48, Kodiak.

Urban, D. 1986. Trip report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Dutch Harbor (unpublished and confidential).

Watson, L.J., and D. Pengilly. 1992. Project operational plan for the 1991 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K92-31, Kodiak.

Watson, L.J., and D. Pengilly. 1993a. Project operational plan for the 1992 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K93-5, Kodiak.

Watson, L.J., and D. Pengilly. 1993b. Project operational plan for the 1990 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K93-17, Kodiak.

Watson, L.J., and D. Pengilly. 1994. Project operational plan for the 1993 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K94-27, Kodiak.

Watson, L.J., and D. Pengilly. 1996. Project operational plan for the 1994 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K96-31, Kodiak.

Watson, L.J., D. Pengilly, and S.C. Byersdorfer. 1995a. Project operational plan for the 1995 St. Matthew Is. blue king crab tagging survey. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K95-48, Kodiak.

LITERATURE CITED (Cont.)

Watson, L.J., D. Tracy, and D. Pengilly. 1995b. Project operational plan for the 1995 Bristol Bay red king crab test fishery project. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K95-2, Kodiak.

Table 1. Average number of golden king crabs harvested by statistical area in the 1992/93, 1993/94, 1994/95, and 1995/96 Adak and Dutch Harbor seasons. (Data source: ADF&G TIX fish ticket database, 4/97).

Statistical Area	Mean Number of Crabs	Four Year Ranking
715202	237,019	1
715231	168,629	2
725201	126,135	3
705232	115,766	4
805132	87,564	5
705200	80,038	6
695301	65,363	7
835200	56,667	8
845202	55,943	9
725230	55,220	10
795132	40,238	11
705300	38,777	12
715232	36,562	13
785131	29,381	14
805201	26,206	15
735230	26,167	16
845130	24,273	17
695232	23,823	18
805103	23,538	19
715201	22,980	20
735201	21,883	21
725203	19,807	22
795200	19,490	23
685304	19,244	24
815131	18,376	25
695200	17,937	26
855200	16,149	27
825201	15,016	28
855231	14,328	29
695302	13,739	30
685231	0	-
685303	0	-
695233	0	-
705231	0	-
705233	0	-
765201	0	-

Table 2. Catch of legal-sized golden king crabs harvested in the 1996/97 Aleutian Islands Management Area from September 1 through December 25, 1996. (Data source: ADF&G TIX fish ticket database, 6/97).

Statistical Area	Harvest (lb.)	Rank
705232	882,220	1
705200	551,086	2
695301	258,463	3
805132	227,869	4
695200	-[1]	5
705300	224,248	6
695232	223,220	7
715231	160,570	8
795132	-[a]	9
725201	110,817	10
685304	-[a]	11
695302	-[a]	12
715232	69,499	13
795200	-[a]	14
725203	-[a]	15
805103	-[a]	16
805201	-[a]	17
715202	32,848	18
815131	-[a]	19
835200	23,373	20
685303	-[a]	21
685231	-[a]	22
735201	-[a]	23
785131	-[a]	24
715201	17,062	25
735230	-[a]	26
845202	-[a]	27
845130	-[a]	28
855231	-[a]	29
705233	-[a]	30
705231	-[a]	31
855200	-[a]	32
725230	-[a]	33
695233	-[a]	34
765201	-[a]	35

[1] Data confidential

Table 3. Catch of legal and sublegal golden king crabs by statistical catch area from the 1991 ADF&G Aleutian Islands golden king crab survey. (Data Source: Blau and Pengilly 1994).

Statistical Area	Stations	Pots	Number of Crabs		Catch Per Pot (CPUE)	
			Legal	Sublegal	Legal	Sublegal
705232	20	195	377	1,204	1.9	6.2
705200	6	60	214	165	3.6	2.8
715231	24	239	477	3,268	2.0	13.7
715202	10	100	200	159	2.0	1.6
Total:	60	594	1,268	4,796	2.1	8.1

Table 4. Number of pots sampled by observers in the 1996/97 Aleutian Islands golden king crab fishery by statistical catch area. Statistical catch areas within the 1997 ADF&G survey area are noted in bold. (Data source: ADF&G Mandatory Shellfish Observer Program database, 6/97).

Statistical Catch Area	Number of Pot Pulls
685231	54
685232	1
685303	95
685304	577
695200	344
695230	3
695232	432
695233	10
695301	209
695302	14
695330	2
695332	3
705200	**662**
705232	**793**
705233	**17**
705234	**3**
705300	64
705301	1
715130	7
715201	**3**
715202	**151**
715231	**102**
715232	**16**
725201	225
725202	13
725203	26
725230	6
735201	54
735202	53
735203	13
735230	89
Total	3,988

Table 5. Station locations for the 1997 Alaska Department of Fish and Game Aleutian Islands golden king crab pot survey. Beginning coordinates are at the western end of each 10 pot station. Contingency stations are noted in bold.

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
1	53	0	171	9.60	53	0	171	8.16
2	53	0	170	29.10	53	0	170	27.66
9	52	55	171	25.80	52	55	171	24.36
10	52	55	171	17.70	52	55	171	16.26
11	52	55	171	9.60	52	55	171	8.16
12	52	55	171	1.50	52	55	171	0.06
13	52	55	170	45.30	52	55	170	43.86
14	52	55	170	37.20	52	55	170	35.76
15	52	55	170	29.10	52	55	170	27.66
16	52	55	170	21.00	52	55	170	19.56
21	**52**	**50**	**171**	**33.90**	**52**	**50**	**171**	**32.46**
22	52	50	171	25.80	52	50	171	24.36
23	52	50	171	17.70	52	50	171	16.26
24	52	50	171	9.60	52	50	171	8.16
25	52	50	171	1.50	52	50	171	0.06
26	52	50	170	53.40	52	50	170	51.96
27	52	50	170	45.30	52	50	170	43.86
28	52	50	170	37.20	52	50	170	35.76
29	52	50	170	29.10	52	50	170	27.66
30	52	50	170	21.00	52	50	170	19.56
37	**52**	**45**	**171**	**33.90**	**52**	**45**	**171**	**32.46**
38	52	45	171	25.80	52	45	171	24.36
39	52	45	171	17.70	52	45	171	16.26
40	52	45	171	9.60	52	45	171	8.16
41	52	45	171	1.50	52	45	171	0.06
42	52	45	170	53.40	52	45	170	51.96
43	52	45	170	45.30	52	45	170	43.86
44	52	45	170	37.20	52	45	170	35.76
45	52	45	170	29.10	52	45	170	27.66
46	52	45	170	21.00	52	45	170	19.56
54	**52**	**40**	**171**	**33.90**	**52**	**40**	**171**	**32.46**
55	52	40	171	25.80	52	40	171	24.36
56	52	40	171	17.70	52	40	171	16.26
57	52	40	171	9.60	52	40	171	8.16
58	52	40	171	1.50	52	40	171	0.06
59	52	40	170	53.40	52	40	170	51.96
60	52	40	170	29.10	52	40	170	27.66
61	52	40	170	21.00	52	40	170	19.56
69	**52**	**35**	**171**	**33.90**	**52**	**35**	**171**	**32.46**

-Continued-

Table 5. (page 2 of 3)

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
70	52	35	171	25.80	52	35	171	24.36
71	52	35	171	17.70	52	35	171	16.26
72	52	35	171	1.50	52	35	171	0.06
73	52	35	170	53.40	52	35	170	51.96
74	52	35	170	29.10	52	35	170	27.66
75	52	35	170	21.00	52	35	170	19.56
91	**52**	**30**	**171**	**33.90**	**52**	**30**	**171**	**32.46**
92	52	30	171	25.80	52	30	171	24.36
93	52	30	171	9.60	52	30	171	8.16
94	52	30	171	1.50	52	30	171	0.06
95	52	30	170	53.40	52	30	170	51.96
96	52	30	170	45.30	52	30	170	43.86
97	52	30	170	37.20	52	30	170	35.76
98	52	30	170	29.10	52	30	170	27.66
99	52	30	170	21.00	52	30	170	19.56
114	**52**	**25**	**171**	**33.90**	**52**	**25**	**171**	**32.46**
115	52	25	171	25.80	52	25	171	24.36
116	52	25	171	9.60	52	25	171	8.16
117	52	25	171	1.50	52	25	171	0.06
118	52	25	170	53.40	52	25	170	51.96
119	52	25	170	45.30	52	25	170	43.86
120	52	25	170	37.20	52	25	170	35.76
121	52	25	170	29.10	52	25	170	27.66
122	52	25	170	21.00	52	25	170	19.56
123	52	25	170	12.90	52	25	170	11.46
124	52	25	170	4.80	52	25	170	3.36
125	52	25	169	56.70	52	25	169	55.26
126	52	25	169	48.60	52	25	169	47.16
136	**52**	**20**	**171**	**33.90**	**52**	**20**	**171**	**32.46**
137	52	20	171	25.80	52	20	171	24.36
138	52	20	171	17.70	52	20	171	16.26
139	52	20	171	9.60	52	20	171	8.16
140	52	20	171	1.50	52	20	171	0.06
141	52	20	170	53.40	52	20	170	51.96
142	52	20	170	45.30	52	20	170	43.86
143	52	20	170	37.20	52	20	170	35.76
144	52	20	170	29.10	52	20	170	27.66
145	52	20	170	21.00	52	20	170	19.56
146	52	20	170	12.90	52	20	170	11.46
147	52	20	170	4.80	52	20	170	3.36

-Continued-

Table 5. (page 3 of 3)

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
156	**52**	**15**	**171**	**33.90**	**52**	**15**	**171**	**32.46**
157	52	15	171	25.80	52	15	171	24.36
158	52	15	171	17.70	52	15	171	16.26
159	52	15	170	53.40	52	15	170	51.96
160	52	15	170	45.30	52	15	170	43.86
161	52	15	170	37.20	52	15	170	35.76
170	**52**	**10**	**171**	**33.90**	**52**	**10**	**171**	**32.46**
171	52	10	171	25.80	52	10	171	24.36
172	52	10	171	17.70	52	10	171	16.26
179	**52**	**5**	**171**	**33.90**	**52**	**5**	**171**	**32.46**

Table 6. Survey itinerary for the 1997 Aleutian Islands golden king crab pot survey. The itinerary will allow sampling of the 89 survey stations within the estimated 30 days allotted for picking the gear.

Date	Pick Three Stations	Set Three Stations
7/25	Travel to survey area (approx. 16 hrs.)ots.	
7/26		+
7/27		+
7/28	+	+
7/29	+	+
7/30	+	+
7/31	+	+
8/1	+	+
8/2	+	+
8/3	+	+
8/4	+	+
8/5	+	+
8/6	+	+
8/7	+	+
8/8	+	+
8/9	+	+
8/10	+	+
8/11	+	+
8/12	+	+
8/13	+	+
8/14	+	+
8/16	+	+
8/17	+	+
8/18	+	+
8/19	+	+
8/20	+	+
8/21	+	+
8/22	+	+
8/23	+	+
8/24	+	+
8/25	+	+
8/26	+	
8/27	+	
8/28	Travel to Dutch Harbor and unload survey gear.	

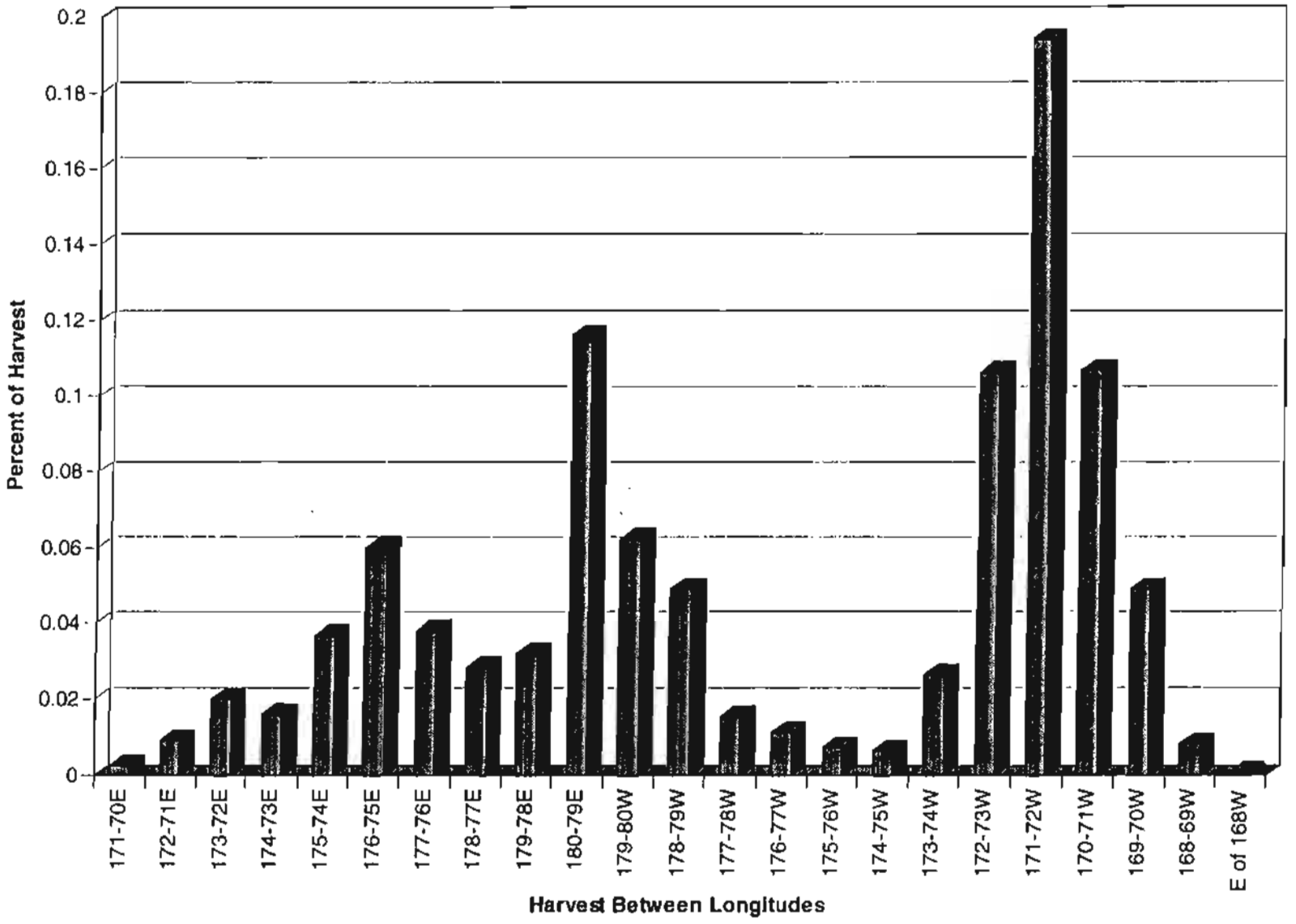


Figure 1. Aleutian Islands cumulative golden king crab harvest between longitudes, 1982 to 1995. (Adapted from Gish 1997)

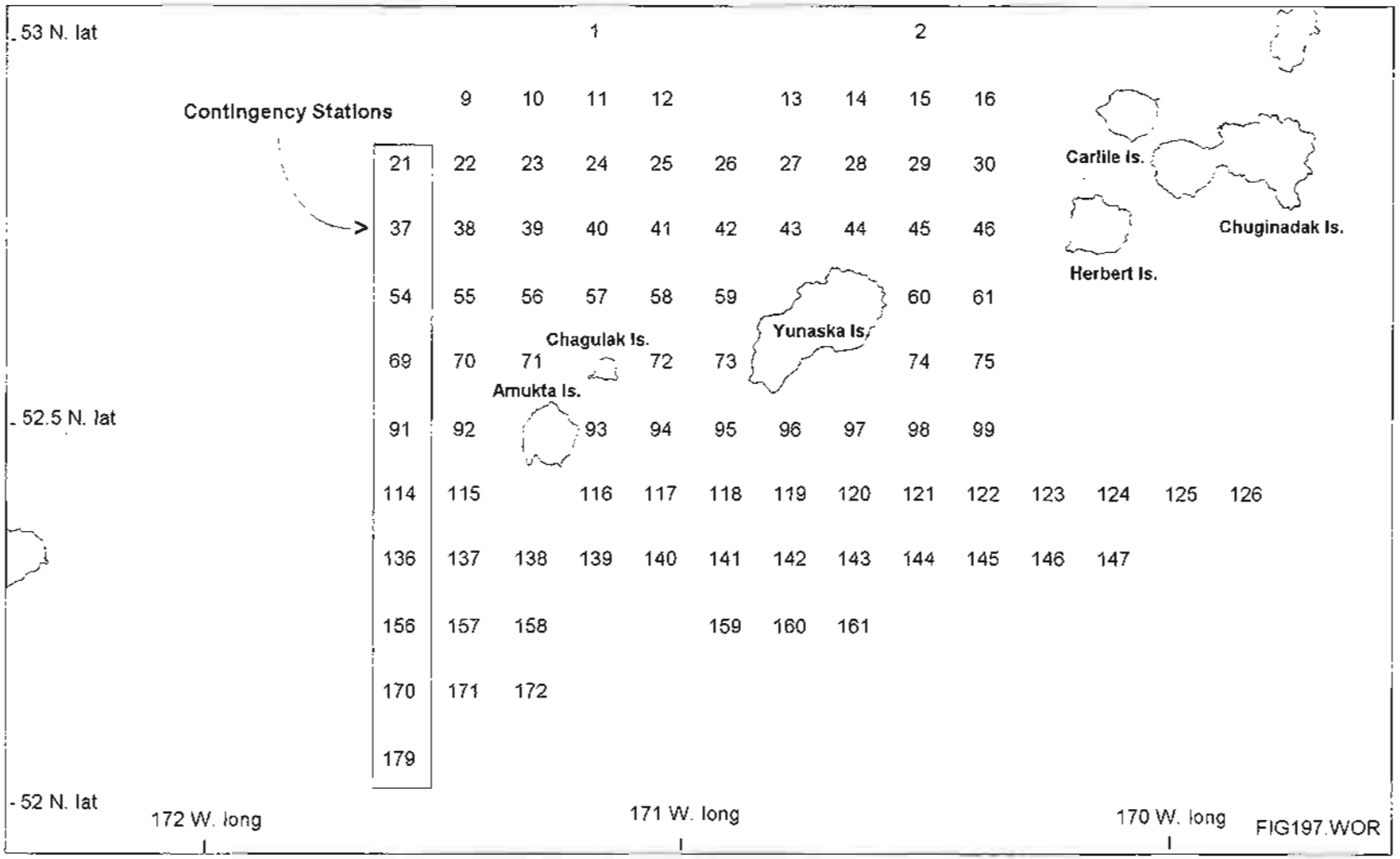


Figure 2. Layout of the 89 stations to be fished on the 1997 Alaska Department of Fish and Game Aleutian Islands golden king crab survey.

APPENDICES

Appendix A. FY98 Yellowbook for the Bering Sea Crab Test Fishery Project (page 1 of 2).

YELLOWBOOK PAGE 1 **4/7/97**

PROJECT TITLE: Bering Sea Crab Test Fishery **PROJECT NUMBER:** TF- 785
FISHERY UNIT: Bering Sea/Aleutian Islands Crab **REGION:** 4
COMPONENT: 400110100-Fisheries Mgmt. **BPS#** ____ **LEDGER CODE:** 741-47785
SUBCOMPONENT: _____
LOCATION: Kodiak **LEGISLATIVE DIST:** 27

PROGRAM ELEMENT: Test Fishery-Funded Survey
FISHERIES AFFECTED: Aleutian Islands Brown King Crab
USER GROUPS AFFECTED: Aleutian Islands Commercial Brown King Crab Fishermen, Vessel Owners, and Processing Industry
SPECIES AFFECTED: Brown King Crab

PROJECT DESCRIPTION

PROJECT OBJECTIVES

BUDGET MANAGER: 11 - 1857 Donn Tracy, Fishery Biologist III

BUDGET DETAIL:	FY96	FY97	FY98
100 PERSONAL SERVICES	200.5	114.9	118.5
200 TRAVEL	15.3	13.5	13.5
300 CONTRACTUAL	222.8	304.9	304.9
400 COMMODITIES	9.0	7.5	7.5
500 EQUIPMENT	7.0	10.0	10.0
700 GRANTS			
PROJECT TOTALS:	446.8	450.8	454.4
FEDERAL RECEIPTS	0.0	0.0	0.0
GENERAL FUND	0.0	0.0	0.0
INTERAGENCY RECPTS	0.0	0.0	0.0
PROGRAM RECEIPTS	446.8	450.8	454.4
CIP FUNDS	0.0	0.0	0.0
STAFF MONTHS	30.0	14.5	12.0

-Continued-

Appendix A. (page 2 of 2).

FY98 FINAL
YELLOWBOOK PAGE 2 PROJECT DESCRIPTION

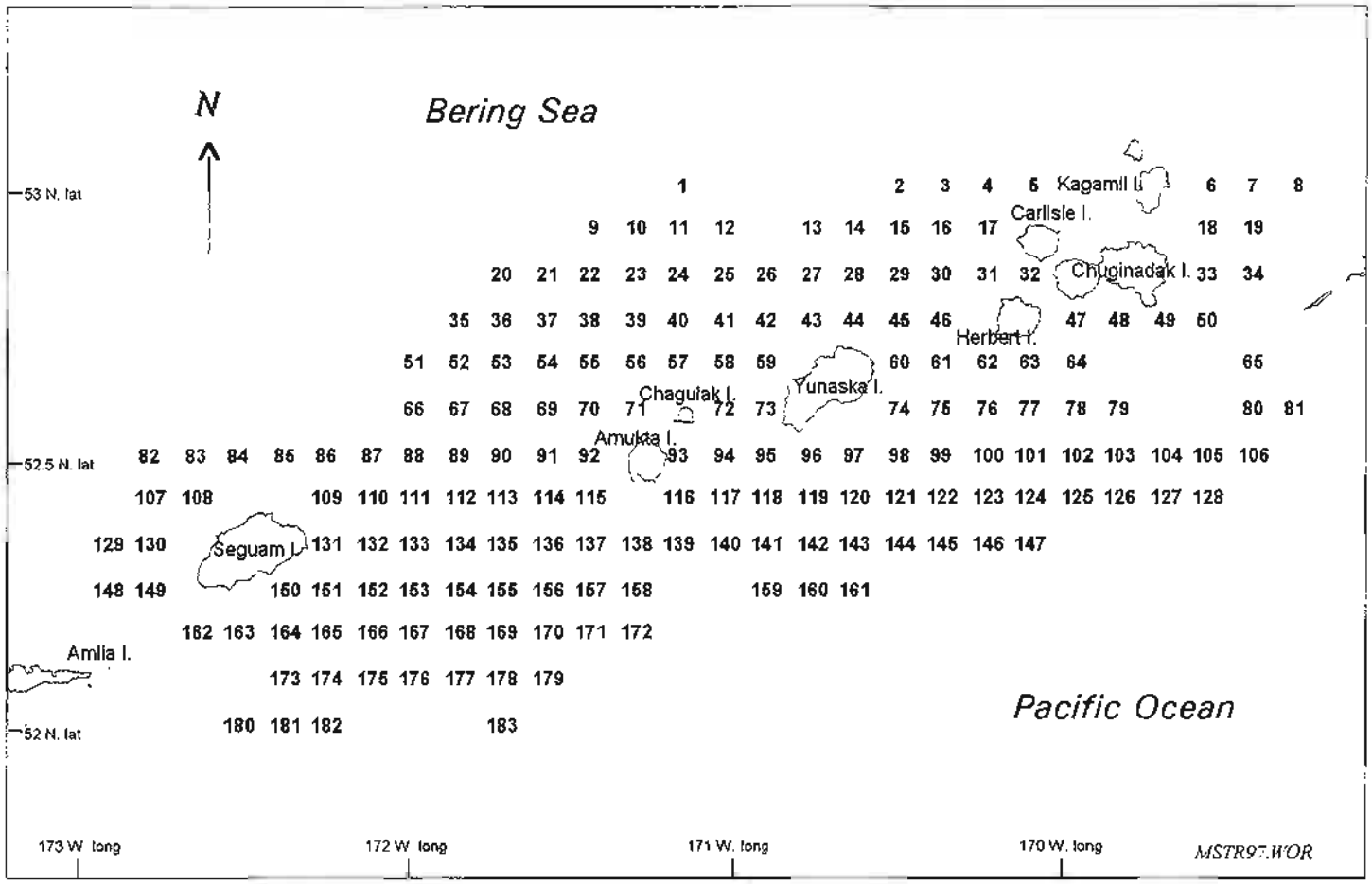
PROJECT TITLE: Bering Sea Crab Test Fishery **PROJECT NUMBER:** TF-785
UNIT: Bering Sea/Aleutian Islands Crab **REGION:** 4
COMPONENT: 400110100-Fisheries Mgmt.

PERSONAL SERVICES DATA **Premium hours----------**

PCN	R	S	LOC	R&S	NAME/TITLE	MM	OT	SEA	HAZ	SWG	GRV	COST
1857	A	P	CAA	18 A	D.Tracy FBIII	0.0	0	21	0	0	0	5250
1037	P	P	BKB	18 F	R. Morrison FBIII	0.0	0	35	0	0	0	8000
7092	P	P	BKB	18	L. Boyle FBIII	0.0	0	35	0	0	0	8000
1006	P	P	CAA	16 M	F. Blau FBII	0.0	0	35	0	0	0	8000
1117	A	S	CAA	14 F	S. Byersdorfer FBI	6.0	60	0	0	0	0	38360
1919	A	S	CAA	12 D	M. Ruccio FBI	0.0	0	28	0	0	0	5000
1319	A	S	CAA	12 D	N. Heim-Blackett DEC	2.0	0	0	0	0	0	6742
1409	A	S	BKB	14 A	H. Moore FBI	1.0	15	28	0	0	0	9592
xxxx	A	S	BKB	11 A	S. Engle FWT III	1.0		28	0	0	0	8050
1428	P	S	CAA	14 F	L. Watson FBI	3.0	0	0	0	0	0	15144
xxxx	A	A	BKB	14 A	DH Seasonal FBI	0.0	0	35	0	0	0	10700
PERSONNEL TOTALS:					13.0	75	245	0	0	0	118498	

PROJECT LINE ITEM DETAIL

LINE#	DESCRIPTION	AMOUNT	COMMENT
72240	Field travel	10.0	Travel
72500	Per diem/other	3.5	Per diem expenses
73000	Charters/Other	304.9	Vessel charters, tags, printing, phone, freight
74520	Misc. Sci. Supply	7.5	
75690	Misc. Equipment	10.0	Computer upgrades
TOTAL LINES 200-500:		335.9	
GRAND TOTAL ALL LINES:		454.4	



Appendix B.1. Survey stations for triennial pot surveys of Aleutian Islands golden king crab established by the Alaska Department of Fish and Game, May 1997. Station numbers denote the western-most end of each station.

Appendix B.2. Station locations for triennial Aleutian Islands golden king crab pot surveys as established by the Alaska Department of Fish and Game, May 1997.

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
1	53	0	171	9.60	53	0	171	8.16
2	53	0	170	29.10	53	0	170	27.66
3	53	0	170	21.00	53	0	170	19.56
4	53	0	170	12.90	53	0	170	11.46
5	53	0	170	4.80	53	0	170	3.36
6	53	0	169	32.40	53	0	169	30.96
7	53	0	169	24.30	53	0	169	22.86
8	53	0	169	16.20	53	0	169	14.76
9	52	55	171	25.80	52	55	171	24.36
10	52	55	171	17.70	52	55	171	16.26
11	52	55	171	9.60	52	55	171	8.16
12	52	55	171	1.50	52	55	171	0.06
13	52	55	170	45.30	52	55	170	43.86
14	52	55	170	37.20	52	55	170	35.76
15	52	55	170	29.10	52	55	170	27.66
16	52	55	170	21.00	52	55	170	19.56
17	52	55	170	12.90	52	55	170	11.46
18	52	55	169	32.40	52	55	169	30.96
19	52	55	169	24.30	52	55	169	22.86
20	52	50	171	42.00	52	50	171	40.56
21	52	50	171	33.90	52	50	171	32.46
22	52	50	171	25.80	52	50	171	24.36
23	52	50	171	17.70	52	50	171	16.26
24	52	50	171	9.60	52	50	171	8.16
25	52	50	171	1.50	52	50	171	0.06
26	52	50	170	53.40	52	50	170	51.96
27	52	50	170	45.30	52	50	170	43.86
28	52	50	170	37.20	52	50	170	35.76
29	52	50	170	29.10	52	50	170	27.66
30	52	50	170	21.00	52	50	170	19.56
31	52	50	170	12.90	52	50	170	11.46
32	52	50	170	4.80	52	50	170	3.36
33	52	50	169	32.40	52	50	169	30.96
34	52	50	169	24.30	52	50	169	22.86
35	52	45	171	50.10	52	45	171	48.66
36	52	45	171	42.00	52	45	171	40.56
37	52	45	171	33.90	52	45	171	32.46
38	52	45	171	25.80	52	45	171	24.36
39	52	45	171	17.70	52	45	171	16.26

-Continued-

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
40	52	45	171	9.60	52	45	171	8.16
41	52	45	171	1.50	52	45	171	0.06
42	52	45	170	53.40	52	45	170	51.96
43	52	45	170	45.30	52	45	170	43.86
44	52	45	170	37.20	52	45	170	35.76
45	52	45	170	29.10	52	45	170	27.66
46	52	45	170	21.00	52	45	170	19.56
47	52	45	169	56.70	52	45	169	55.26
48	52	45	169	48.60	52	45	169	47.16
49	52	45	169	40.50	52	45	169	39.06
50	52	45	169	32.40	52	45	169	30.96
51	52	40	171	58.20	52	40	171	56.76
52	52	40	171	50.10	52	40	171	48.66
53	52	40	171	42.00	52	40	171	40.56
54	52	40	171	33.90	52	40	171	32.46
55	52	40	171	25.80	52	40	171	24.36
56	52	40	171	17.70	52	40	171	16.26
57	52	40	171	9.60	52	40	171	8.16
58	52	40	171	1.50	52	40	171	0.06
59	52	40	170	53.40	52	40	170	51.96
60	52	40	170	29.10	52	40	170	27.66
61	52	40	170	21.00	52	40	170	19.56
62	52	40	170	12.90	52	40	170	11.46
63	52	40	170	4.80	52	40	170	3.36
64	52	40	169	56.70	52	40	169	55.26
65	52	40	169	24.30	52	40	169	22.86
66	52	35	171	58.20	52	35	171	56.76
67	52	35	171	50.10	52	35	171	48.66
68	52	35	171	42.00	52	35	171	40.56
69	52	35	171	33.90	52	35	171	32.46
70	52	35	171	25.80	52	35	171	24.36
71	52	35	171	17.70	52	35	171	16.26
72	52	35	171	1.50	52	35	171	0.06
73	52	35	170	53.40	52	35	170	51.96
74	52	35	170	29.10	52	35	170	27.66
75	52	35	170	21.00	52	35	170	19.56
76	52	35	170	12.90	52	35	170	11.46
77	52	35	170	4.80	52	35	170	3.36
78	52	35	169	56.70	52	35	169	55.26
79	52	35	169	48.60	52	35	169	47.16

-Continued-

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
80	52	35	169	24.30	52	35	169	22.86
81	52	35	169	16.20	52	35	169	14.76
82	52	30	172	46.80	52	30	172	45.36
83	52	30	172	38.70	52	30	172	37.26
84	52	30	172	30.60	52	30	172	29.16
85	52	30	172	22.50	52	30	172	21.06
86	52	30	172	14.40	52	30	172	12.96
87	52	30	172	6.30	52	30	172	4.86
88	52	30	171	58.20	52	30	171	56.76
89	52	30	171	50.10	52	30	171	48.66
90	52	30	171	42.00	52	30	171	40.56
91	52	30	171	33.90	52	30	171	32.46
92	52	30	171	25.80	52	30	171	24.36
93	52	30	171	9.60	52	30	171	8.16
94	52	30	171	1.50	52	30	171	0.06
95	52	30	170	53.40	52	30	170	51.96
96	52	30	170	45.30	52	30	170	43.86
97	52	30	170	37.20	52	30	170	35.76
98	52	30	170	29.10	52	30	170	27.66
99	52	30	170	21.00	52	30	170	19.56
100	52	30	170	12.90	52	30	170	11.46
101	52	30	170	4.80	52	30	170	3.36
102	52	30	169	56.70	52	30	169	55.26
103	52	30	169	48.60	52	30	169	47.16
104	52	30	169	40.50	52	30	169	39.06
105	52	30	169	32.40	52	30	169	30.96
106	52	30	169	24.30	52	30	169	22.86
107	52	25	172	46.80	52	25	172	45.36
108	52	25	172	38.70	52	25	172	37.26
109	52	25	172	14.40	52	25	172	12.96
110	52	25	172	6.30	52	25	172	4.86
111	52	25	171	58.20	52	25	171	56.76
112	52	25	171	50.10	52	25	171	48.66
113	52	25	171	42.00	52	25	171	40.56
114	52	25	171	33.90	52	25	171	32.46
115	52	25	171	25.80	52	25	171	24.36
116	52	25	171	9.60	52	25	171	8.16
117	52	25	171	1.50	52	25	171	0.06
118	52	25	170	53.40	52	25	170	51.96
119	52	25	170	45.30	52	25	170	43.86

-Continued-

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
120	52	25	170	37.20	52	25	170	35.76
121	52	25	170	29.10	52	25	170	27.66
122	52	25	170	21.00	52	25	170	19.56
123	52	25	170	12.90	52	25	170	11.46
124	52	25	170	4.80	52	25	170	3.36
125	52	25	169	56.70	52	25	169	55.26
126	52	25	169	48.60	52	25	169	47.16
127	52	25	169	40.50	52	25	169	39.06
128	52	25	169	32.40	52	25	169	30.96
129	52	20	172	54.90	52	20	172	53.46
130	52	20	172	46.80	52	20	172	45.36
131	52	20	172	14.40	52	20	172	12.96
132	52	20	172	6.30	52	20	172	4.86
133	52	20	171	58.20	52	20	171	56.76
134	52	20	171	50.10	52	20	171	48.66
135	52	20	171	42.00	52	20	171	40.56
136	52	20	171	33.90	52	20	171	32.46
137	52	20	171	25.80	52	20	171	24.36
138	52	20	171	17.70	52	20	171	16.26
139	52	20	171	9.60	52	20	171	8.16
140	52	20	171	1.50	52	20	171	0.06
141	52	20	170	53.40	52	20	170	51.96
142	52	20	170	45.30	52	20	170	43.86
143	52	20	170	37.20	52	20	170	35.76
144	52	20	170	29.10	52	20	170	27.66
145	52	20	170	21.00	52	20	170	19.56
146	52	20	170	12.90	52	20	170	11.46
147	52	20	170	4.80	52	20	170	3.36
148	52	15	172	54.90	52	15	172	53.46
149	52	15	172	46.80	52	15	172	45.36
150	52	15	172	22.50	52	15	172	21.06
151	52	15	172	14.40	52	15	172	12.96
152	52	15	172	6.30	52	15	172	4.86
153	52	15	171	58.20	52	15	171	56.76
154	52	15	171	50.10	52	15	171	48.66
155	52	15	171	42.00	52	15	171	40.56
156	52	15	171	33.90	52	15	171	32.46
157	52	15	171	25.80	52	15	171	24.36
158	52	15	171	17.70	52	15	171	16.26
159	52	15	170	53.40	52	15	170	51.96

-Continued-

Appendix B.2. (page 5 of 5)

	Beginning				Ending			
	N Latitude		W Longitude		N Latitude		W Longitude	
Station	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes	Degrees	Minutes
160	52	15	170	45.30	52	15	170	43.86
161	52	15	170	37.20	52	15	170	35.76
162	52	10	172	38.70	52	10	172	37.26
163	52	10	172	30.60	52	10	172	29.16
164	52	10	172	22.50	52	10	172	21.06
165	52	10	172	14.40	52	10	172	12.96
166	52	10	172	6.30	52	10	172	4.86
167	52	10	171	58.20	52	10	171	56.76
168	52	10	171	50.10	52	10	171	48.66
169	52	10	171	42.00	52	10	171	40.56
170	52	10	171	33.90	52	10	171	32.46
171	52	10	171	25.80	52	10	171	24.36
172	52	10	171	17.70	52	10	171	16.26
173	52	5	172	22.50	52	5	172	21.06
174	52	5	172	14.40	52	5	172	12.96
175	52	5	172	6.30	52	5	172	4.86
176	52	5	171	58.20	52	5	171	56.76
177	52	5	171	50.10	52	5	171	48.66
178	52	5	171	42.00	52	5	171	40.56
179	52	5	171	33.90	52	5	171	32.46
180	52	0	172	30.60	52	0	172	29.16
181	52	0	172	22.50	52	0	172	21.06
182	52	0	172	14.40	52	0	172	12.96
183	52	0	171	42.00	52	0	171	40.56

Appendix C.1.

PILOT HOUSE LOG - ALEUTIAN ISLANDS TRIENNIAL GOLDEN KING CRAB SURVEY

DISTANCE BETWEEN POTS: 100 FM

RECORDER: Steve Hall

VESSEL: Spirit of the North

YEAR: 1997

STATION* [ ][ ][ ]

RADIO BEACON ID: _____ kHZ

SET GEAR					DEPTH	BOT	SEQUENTIAL	BUOY	LIFT GEAR*			LATITUDE-N			LONGITUDE-W		
MONTH	DAY	MILITARY TIME			(FM)	TYPE**	POT NUMBER*	NO.	MONTH	DAY	MILITARY TIME	DEG.	MIN.	SEC.	DEG.	MIN.	SEC.

C:\LESLIE\ADAK97\SKIPFORM.XLS

*Skipper **must** tell ADF&G crew what station is being pulled and the sequential pot number of each pot when landed on deck.
"Lost pot" must be written across the appropriate Lift Gear boxes, but keep its sequential pot number.
Notify the ADF&G deck crew whenever a pot is lost and what it's sequential pot number is so that the proper notation can be made on the on-deck sampling forms.

**Bottom type codes: 1-Rock; 2-Sand; 3-Silt; and 4-Mud.

ADF&G ALEUTIAN ISLANDS TRIENNIAL GOLDEN KING CRAB SURVEY DATA FORM

Appendix C.2.

STATION NUMBER

BUOY NOS; WEST END

EAST END

MEASURER _____

RECORDER _____

DATE 0 _ _ _ 9 7

PAGE _____ OF _____

	SEQUENTIAL POT NUMBER			SPECIES			SEX	SIZE CRABS (MM) FISH (CM)			LEGAL	SHELL AGE	EMBRYOS COLOR	EMBRYOS DEVELOPMENT	EMBRYOS CONDITION	EMBRYOS % CLUTCH	OTHER		WEIGHT (GRAMS)				OVARIAN WEIGHT (GRAMS)			TAG NUMBER				COMMENTS
1																													
2																													
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													
13																													
14																													
15																													
16																													
17																													
18																													
19																													
20																													
21																													
22																													
23																													
24																													
25																													

Crab Species
1-*L. aequispinus*
2-*P. camtschaticus*
4-*Erimacrus*
5-*C. angulatus*
6- *C.bairdi*
10-*L. couesi*
11-*C. tanneri*
12- *Par. multispina*

Fish & Invert. Species
See coded species list

Sex
1- Male
2- Female

Legal
1- Sublegal
2- Legal

Shell Age
0- Soft
1- New-Pliable
2- New-Hard
3- Old
4- Very Old

Live Embryo Color
1- Tan
2- Purple
3- Brown
4- Orange
5- Purple-brown
6- Pink
7- Reddish
0- Other, describe in Comments

Embryo Devel.
1- Uneyed
2-Eyed
3- Hatching

Clutch Condition
1- Dead embryos not apparent
2 - Dead embryos <20%
3- Dead embryos >20%

Percent Clutch
1- Barren, clean pleopods
2-Barren with empty emt embryo cases & or
3- Clutch 1-29% full
4- Clutch 30-59% full
5- Clutch 60-89% full
6- Clutch 90-100% full

Others
1- Dead
2-Alive
3-Nemerteans in clutch
4-Turbellarians in clutch
5-Black mat
6-Bitter crab disease
7-"Cottage cheese" disease
8-Shell rust
9-*B. callosus*
0- Leatherback, male golden king crab with soft carapace & is old or very-old shell

C:\Forrest\adak97\gkcform.xls

Appendix C.3. GOLDEN KING CRABS IN MINNOW TRAPS

1997 ALEUTIAN ISLANDS GOLDEN KING CRAB SURVEY

FV *SPIRIT OF THE NORTH*

PAGE _____ OF _____

MEASURER _____

RECORDER _____

DATE 0 _ _ _ 9 7

	STATION	SEQUENTIAL POT NUMBER	BAIT (a)	SEX (b)	SIZE (mm CL)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

	STATION	SEQUENTIAL POT NUMBER	BAIT (a)	SEX (b)	SIZE (mm CL)
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					

	STATION	SEQUENTIAL POT NUMBER	BAIT (a)	SEX (b)	SIZE (mm CL)
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					

(a) Bait: 1=herring; 2=sponge; 3=none.

(b) Sex: 1=male; 2=female.

Note: All golden king crabs caught in minnow traps are new-shell.

Appendix D.1. 1997 Aleutian Islands Brown King Crab Tagged Crab Recovery Instructions For Dockside Samplers.

Introduction

ADF&G has completed a 35 day tagging survey of brown (golden) king crabs in the Aleutian Islands area centered around Yunaska and Amukta Islands (52°30'N. latitude, 171°W longitude). Approximately ten thousand male and female brown king crabs were tagged during the July 25 - August 28, 1997 survey onboard the FV *Spirit of the North*. Although 100% of the vessels will be assigned observers, it is likely that some tagged crabs and/or tag recovery information will not be documented by observers. Dockside samplers play a vital role in retrieval of tagged crabs and tag recovery information during the skipper interview and catch sampling programs. Recovery information from tagged crabs is necessary for estimation of the fishing mortality on legal males, and enhances existing information on growth, maturity, distribution, and survivorship that, to date, is poorly understood.

Tag Description

The 1997 Floy tags are fluorescent green with white tabs and are similar to the orange spaghetti tag used in the 1991 Aleutian tagging study. Tags were inserted through the isthmus muscle of the crab and hand-tied. The green tubing has the tag series 'B' followed by the tag number (5 digits) printed on it. The white tab has "LEAVE TAG ON CRAB - NOTIFY ADFG" printed on one side, and the tag series 'B' followed by the tag number (5 digits) printed on the reverse side.

General Instructions

A news release has been issued to Aleutian Islands fishermen requesting their help in the recovery of tagged crabs. Dockside samplers should ask vessel captains and crews during the skipper interview if there are tags or tagged crabs aboard, if they have recapture information for any tagged crabs, and if they have recovery information for any tagged crabs they may have caught and rereleased at sea. Please collect this information during your interview and sample all tagged crabs. If you are given only a tag, note that on the recovery form and record the fate of the crab as dead. Let the offloading crew know that tagged crabs may be aboard; keep an eye out for tagged crabs as the offloaders throw crabs into the braillers. If time permits, walk through the processing area and inform the foreman that there may be tagged crabs in deliveries.

After tagged crab sampling has been completed, crabs will be returned as follows:

-Continued-

Tagged legal male brown king crabs will be returned to the processing line after all required data is recorded and the tag is removed.

Tagged sublegal male, and all female brown king crabs will be fully sampled, the tag removed, and the crab placed in the vessel's deadloss pile. Do not throw live sublegal males or females over the side of the vessel during tag sampling.

All tag recoveries will be fully documented on the attached two page form. All tags and tag recovery forms, including those collected from vessel captains, should be returned to ADF&G in Dutch Harbor at the end of each sampler's shift.

Tag Reward Program

Tags and tagged crabs may come from the vessel crews, captains, or processing workers whereas recovery information may only come from the captain or his relief skipper. Tag reward hats will be given to individuals who present either a tagged crab or a tag to the dockside sampler or ADF&G staff. Tag reward hats may be issued at the time of sampling, or if unavailable, given or mailed to the tag finder at a later date. Dockside samplers will be issued tag reward hats to enhance the visibility of the tagging program, but are not eligible for tag rewards; please credit tag returns appropriately.

Appendix D.2. 1997 Aleutian Islands Brown King Crab Tagged Crab Recovery Instructions For Shellfish Observers.

Introduction

ADF&G has completed a 35 day tagging survey of brown (golden) king crabs in the Aleutian Islands area centered around Yunaska and Amukta Islands (52°30'N. latitude, 171°W longitude). Approximately ten thousand male and female brown king crabs were tagged during the July 28 - August 31, 1997 survey onboard the FV *Spirit of the North.* Onboard observers are the primary means of recovering tagged crabs from this survey. Shellfish observers have the unique opportunity to sample crabs at sea where small sublegal males and females can be re-released near their initial capture location.. This data is necessary for estimation of the fishing mortality of legal males, and enhances existing information on growth, maturity, distribution, and survivorship that to-date, is poorly understood.

Tag Description

The 1997 Floy tags are fluorescent green with white tabs and are similar to the orange spaghetti tag used in the 1991 Aleutian tagging study. Tags were inserted through the isthmus muscle of the crab and hand-tied. The green tubing has the tag series 'B' followed by the tag number (5 digits) printed on it. The white tab has "LEAVE TAG ON CRAB - NOTIFY ADFG" printed on one side, and the tag series 'B' followed by the tag number (5 digits) printed on the reverse side.

General Instructions

A news release has been issued to Aleutian Islands fishermen requesting their help in the recovery of tagged crabs. Shellfish observers assigned to floating processors should ask for forms and recovered tags from all catcher vessel delivering to their assigned processor. Observers assigned to catcher-processors should inform the captain, crew, and processing personnel to be on the look-out for tagged crabs, set them aside, and immediately contact the observer so that (s)he may sample the crab(s). Stress to the captain, crew, and processing personnel that the crabs should not be damaged or processed, and that the tags should be left on the crab. Explain the obvious: that if a tagged sublegal male or female crab is encountered, the tag must be left on the crab as it will be re-released following sampling. If you are given only a tag, note that on the recovery form and record the fate of the crab as dead.

-Continued-

After tagged crab sampling has been completed, crabs will be returned as follows:

Tagged legal male brown king crabs will be returned to the processing line after all required data is recorded and the tag is removed.

Tagged sublegal male and female brown king crabs will be sampled as soon as possible and, *with the tag intact,* returned to the sea as gently as possible. If the tag is pulled out, the crab will bleed to death; if the tag is cut off, the possibility of recording multiple recaptures for that animal are extinguished.

All tagged crab recoveries should be fully documented as shown on the attached two page form. All tags and tag recovery forms, including those collected from vessel captains should be returned to ADF&G in Dutch Harbor at the time of your debriefing.

Tag Reward Program

Tags and tagged crabs may come from the observer, vessel crews, captains, or processing workers whereas recovery information may only come from the observer or the captain or his relief skipper. Tag reward hats will be given to individuals who present either a tagged crab or a tag to the observer. Tag reward hats will be issued by observers or ADF&G staff at your debriefing, or if unavailable, given or mailed to the tag finder at a later date. Observers will be issued tag reward hats to enhance the visibility of the tagging program, but are not eligible for tag rewards; please credit tag returns appropriately.

Appendix D.3. Observer and dockside sampler instructions for completing the ADF&G Westward Region Tagged Crab Recovery Form.

Please read these instructions carefully and fill out required information accurately.

SIDE 1: Tag Recovery Information

SPECIES: Brown (golden) king crab.

FISHERY CODE: OB97 (Aleutian Islands Area O Brown King Crab).

OBSERVER/DOCKSIDE SAMPLER: Record your name.

SEQUENTIAL POT NUMBER: For observer use only. Record the sequential pot number when tagged crabs are recovered from pots selected for Bycatch sampling (see Observer manual). If tagged crabs are found within the 600-crab Legal tally, note this in the Comments section on side 2 of this form.

FLOY TAG SERIES & NUMBER: See tag description above. **1997** tags are fluorescent green with a white tab, and are printed with the tag series 'B' followed by a 5-digit number; record both the series and tag number. Tagged crabs from the **1991** Aleutian survey may also be captured; these tags are orange with no tab, and are printed with "ADF&G ADAK C' followed by the 5-digit tag number; record both the series and tag number. The 1991 tags may be unreadable until they are brought back to the lab and are looked at under a microscope. Please attach tags to the form even if you can't read the tag number. Tagged crabs from the **1996/97** FV Alaska Trojan observer tagging effort may also be captured; the tags are yellow with an orange tab, and are printed with the tag series "A" followed by a 5-digit number. Record both the series and tag number.

SIZE: Record the carapace length in millimeters (mm). Measure the crab twice before recording; variation in measurement size is common.

LEGAL: Identify measured male crabs as either 1=sublegal, or 2=legal. Legal crabs are 6" (152.4 mm) or greater in carapace width outside the spines.

SEX: Record sex. Male=1, Female=2.

SHELL: Record shell condition. Soft=0; New=1; Old=2; Very Old=3.

FATE: Record fate of sampled crabs. 1=Retained for sale; 2=Released alive; 3=Dead (not retained for sale; e.g., found in the deadloss pile or frozen for ADF&G/Observer sampling, etc.).

CAPTURE DATE: Use month-day-year format.

CAPTURE LOCATION: Latitude and longitude coordinates from the captain, in degrees and minutes, with minutes to the hundredths (convert seconds to hundredths of minutes). If lat/long information is not available, write "N/A" across the lat/long data columns. If east longitude, please note.

-Continued-

DEPTH: In fathoms only.

STATISTICAL AREA: Determine from statistical area charts. If lat/long coordinates are not known, but capture location has been identified by the captain within a statistical catch area, record that statarea number. If no information is available, write "N/A" across the statistical area data columns.

ADF&G VESSEL NUMBER: Record the ADF&G number of the vessel that landed the tagged crab.

RECEIVED TAG OR TAGGED CRAB FROM: Record full name, address and phone number of the individual who gave you the tag or tagged crab. Check the "Needs hat" box. When the hat has been given to the tag finder, check the "Issued hat" box. If you do not issue hats, make sure that this form is given to Holly Moore, ADF&G Assistant Bering Sea/Aleutian Islands Shellfish Research Biologist and Mandatory Observer Program Database Management Coordinator.

RECEIVED RECOVERY LOCATION DATA FROM: Record full name, address and phone number.

VESSEL NAME: Name of the vessel that landed the tagged crab.

PROCESSOR NAME: Name of the processor that the tagged crab was delivered to.

SAMPLING DATE: Date that the tag or tagged crab was received and/or sampled.

SIDE 2: Female Reproductive Data and Comments Section

This side of the tag recovery form is used to record female reproductive data and "Other" comments on tagged male and female crabs. Refer to codes on the bottom of the form for appropriate assignment of embryo (egg) color and development, clutch condition and percent clutch fullness, and other conditions not covered elsewhere (disease/parasites). Record males with shell rust, *Briarosaccus callosus,* and/or 'leatherback' condition in the 'Other' column. If male crabs have more than one "Other" codes, record all of them in the Comments section. *For shellfish observers*: Record sequential pot number. Codes for clutch condition, percent clutch, and "Other" categories are somewhat different from the codes you use on the Crab and Fish Measurement form. If tagged crabs are found within the 600-crab Legal tally, note this in the Comments section.

Appendix D.4. ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM

SPECIES _____ **FISHERY CODE** _____ **OBSERVER/ DOCKSIDE SAMPLER** _____

	SEQ. POT NO.	FLOY TAG SERIES & NUMBER	SIZE (mm) KING - CL TANNER - CW	LEGAL (a)	SEX (b)	SHELL (c)	FATE (d)	CAPTURE DATE MO.	DAY	YEAR	CAPTURE LOCATION (Note: "E." longitude if applicable) N. LATITUDE	W. LONGITUDE	DEPTH (FM)	STATISTICAL AREA	ADF&G VESSEL NO.
1															
2															
3															
4															
5															

(a) **LEGAL**: 1=Sublegal; 2=Legal. (b) **SEX**: 1=Male; 2=Female. (c) **SHELL AGE**: 0=Soft; 1=New; 2=Old; 3= Very Old.
(d) **FATE**: 1=Retained for sale; 2=Released alive; 3=Dead (not retained for sale; found in deadloss pile or frozen whole for ADF&G/Observer sampling).
NOTE: If a tagged female crab, record additional information on the back of this form. Record comments for males and females on the back of this form.

	Received Tag or Tagged Crab From: Name, Address & Phone	Received Recovery Location Data From: Name, Address & Phone	Vessel Name	Processor Name	Sampling Date Mo.	Day	Year
1	Needs hat ☐ Issued hat ☐						
2	Needs hat ☐ Issued hat ☐						
3	Needs hat ☐ Issued hat ☐						
4	Needs hat ☐ Issued hat ☐						
5	Needs hat ☐ Issued hat ☐						

Edited by: Date: Entered by: Date: c:leslie\adak97\tagrec97.xls 7/97

ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM

(REVERSE SIDE)

*	SEQ. POT NO.	EMBRYOS				OTHER	COMMENTS
		COLOR	DEVELOPMENT	CONDITION	% CLUTCH		
1							
2							
3							
4							
5							

LIVE EMBRYO COLOR

1-Tan
2-Purple
3-Brown
4-Orange
5-Purple-brown
6-Pink
7-Reddish
0-Other; describe in Comments.

EMBRYO DEVELOPMENT

1-Uneyed
2-Eyed

CLUTCH CONDITION

1-Dead embryos not apparent
2-Dead embryos <20 %
3-Dead embryos >20%

PERCENT CLUTCH

1-Barren, clean pleopods
2-Barren, with empty embryo cases and/or stalks
3-Clutch 1-29% full
4-Clutch 30-59% full
5-Clutch 60-89% full
6-Clutch 90-100% full

OTHER

3-Nemerteans in clutch
4-Turbellarians in clutch
5-Black mat syndrome
6-Bitter crab syndrome
7-"Cottage cheese" disease
8-Shell rust
9-*Briarosaccus callosus* (sac-like parasitic barnacle on king crab abdomens)
0-Leatherback: male brown king crab w/soft carapace & is old or very old shell

SPECIES	CHANGES IN EMBRYO COLOR		COMMENTS
	UNEYED	EYED-WELL DEVELOPED	
Red King	Purple	Reddish	Occasionlly brown or gray intermediate.
Blue King	Purple	Pinkish-reddish	
Golden (brown) king	Orange	Tan	
Tanner (*C. bairdi*)	Orange	Brown or purple brown	
Snow (*C. opilio*)	Orange	Brown or purple brown	

Note: If other species are tagged, update this form before use.